Leptons

ST3xx

ST4xx

ST5xx

Programming Manual

Release 1.3

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1 Introduction

This document describes the programming commands for the ST302, ST312, ST314, ST403, ST406 printers.

2 Technical specifications

	St302	St312	St314	St403	St406	St514	St516
Print method	Direct thermal	Direct thermal Ther. transfer	Direct thermal Ther. transfer	Direct thermal Ther. transfer	Direct thermal Ther. transfer	Direct thermal Ther. transfer	Direct thermal Ther. transfer
Resolution	8dot	8dot	8dot	8dot	8dot	8dot	8dot
Print speed	20-170mm/s	20-170mm/s	20-170mm/s	50-200mm/s	50-200mm/s	50-200mm/s	50-200mm/s
Paper feed speed	50-200mm/s	50-200mm/s	50-200mm/s	50-250mm/s	50-250mm/s	50-250mm/s	50-250mm/s
Print area	Width 56mm	Width 56mm	Width 104mm	Width 80mm	Width 160mm	Width 104mm	Width 160mm
	Length 197mm(771)	Length 197mm(771)	Length 413mm	Length 539mm(1250)	Length 1250mm	Length 1250mm	Length 1250mm
Label width	From 40 to 60	From 10 to 60	From 20to110	From 40 to 90	From 40to180	From 40to110	From 60to180
External Diameter roll	140mm	140mm	150mm	300mm	300mm	300mm	300mm
Internal Diameter roll	40mm	40mm	40mm	40mm	40mm	adjustable 40-75mm	adjustable 40-75mm
Label sensor	1Trasparency	1Trasparency	1Trasparency	2Trasparency 1 Reflective	2Trasparency 1 Reflective	2Trasparency 1 Reflective	2Trasparency 1 Reflective
Power supply	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz	230Vac 50/60Hz
Absorption	150W	150W	200W	200W	400W	400W	400W
Dimensions	Height.195 Width.190 Depth.395	Height.195 Width.190 Depth.395	Height.245 Width.190 Depth.380	Height.545 Width.300 Depth.380	Height.545 Width.390 Depth.380	Height.600 Width.335 Depth.410	Height.600 Width.390 Depth.410
Weight	8kg	8.5kg	13kg	13.7kg	16kg	15kg	17kg
Interface [speed]	RS232 [300-38400]	RS232 [300-38400]	RS232 [300-38400]	RS232 [300-38400] Centronics Relè Photocell. Applicator Rewinder /Cutter	RS232 [300-38400] Centronics Relè Photocell. Applicator Rewinder /Cutter	RS232 [300-38400] Centronics Relè Photocell. Applicator Rewinder /Cutter	RS232 [300-38400] Centronics Relè Photocell. Applicator Rewinder /Cutter

Label thickness : From 60 a 200 µm (50 a 180 g/m2)
Environmental characteristics: From 5 to 40 °C
Humidity: From 20 to 90% non condensing

3 Description of the Printer

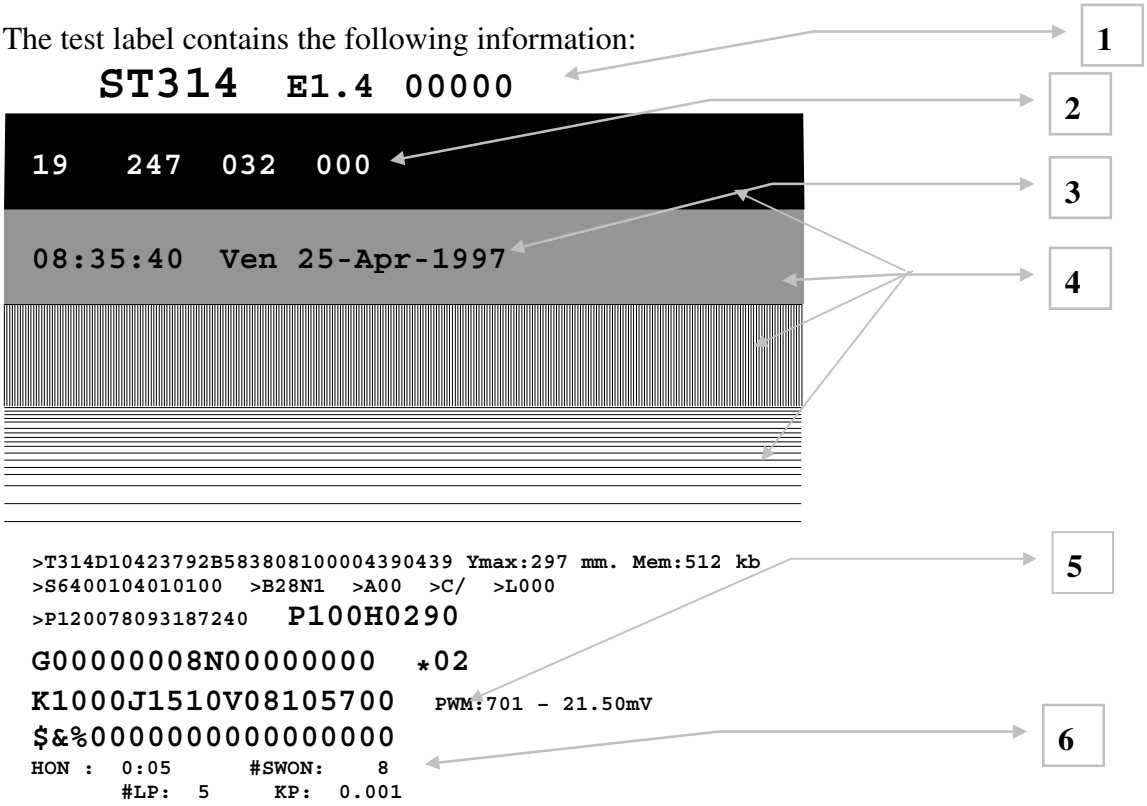
The ST3XX, ST4XX and ST5XX printers are equipped with a front panel having two keys PAUSE and FEED, a red led for POWER, a green led for LINE and a yellow led for PRINT.
On switching the printer on the POWER indicator will light up and, after a short initialisation period, the LINE indicator will also light up. If the printer is in normal operating

conditions, with labels and ribbon correctly installed, a test label will be printed (unless deactivated in configuration). The PRINT indicator lights up during printing.

Note: Printing of the test label can be deactivated with the /$&% command.

4 Test label

The test label contains the following information:



1. Printer model, ROM type (E = EPROM, F = flash memory), firmware version and serial number.
2. Printhead temperature, photo sensor sensitivity (label pass, end paper, end ribbon).
3. Current date and time are printed in the grey area of the model.
4. A dot map (useful in checking the print quality and alignment of the print head) with a black area, a grey area, vertical and horizontal lines with different spacings.
5. Current configuration parameters of the printer. The configuration parameters are stored in the non-volatile memory of the printer.

>T	Identification and configuration parameters of the memory
>S	Label feed parameters
>B	Serial interface parameters
>A	Network address
*O	Print orientation
>P	Photo sensor sensitivity
P	Sensitivity of label photo sensor currently selected

H	Alignment of label (offset)
G	Print area x and y coordinates origin
N	Cutter parameters
K	Print mode
J	Print speed and image
V	Paper feed speed and printhead energy
$&%	Memory string and printer function selector

6. I counters used are printed in the last two lines of the test label as follows:

HON: 0:00 total time the printer is switched on (hours :minutes)
#SWON: 0 number of times printer switched on
#LP: 0 total number of labels printed
KP: 0.000 total number of kilometres of paper printed

5 Operating status

ON LINE is the normal function: the green led is on and the printer is ready to receive data from the serial line.
PRINT mode is when the printer is printing: the yellow PRINT led is on, data reception is suspended and the printer only accepts data for the variable fields. Subsequent print commands cannot be received and stored in the buffer unless the printer has been configured for "double bitmap" in which case it will continue to receive data for the next label whilst it is still printing the previous label.
OFF LINE in this mode the led is off as is the PRINT led (it will flash if there is a suspended print session), incoming data will not be processed and will be stored in the reception buffer.

6 Led indicators

There are three led indicators on the front panel protected by a membrane:

6.1 POWER LED

This indicator is red and shows that the printer is on.

6.2 LINE LED

This indicator is green and gives information on the Command Interpreter.
Continually on -indicates that the printer is ON-LINE and can process data received.
Flashes irregularly –while the Command Interpreter is processing the data in the reception buffer. The flashing speed is linked to the speed of the data processed and may not be visible in all cases on the ST4xx series.
Flashes at regular intervals when data is required to complete a command or to fill in a variable data filed on the next label to be printed.
Continually off – when the Command interpreter is not processing data received or because the printer is OFF-LINE.

6.3 PRINT LED

This indicator is yellow and gives information on the current print session.
Continually off -when it is not printing and there is no suspended session.
Continually on -when a print session is in progress, even if the printer is not printing because it is waiting for data to fill in variable fields.
Flashes at regular intervals –whenever a print session is suspended for any reason (pause command, printer error, synchronism with external device, etc.)

7 Keys

There are two keys on the control panel protected by a membrane:

7.1 Pause key

Switches the printer from ON-LINE to OFF-LINE and vice versa.

7.2 Feed key

Does not have any effect when pressed by itself with the printer ON-LINE but will print a copy of the last label printed or to issue a blank label when the printer is in OFF-LINE status.

8 Using the keys

The two keys can also be used for other functions: abort, reset, macro recall, calibration)

8.1.1 Abort

Press PAUSA + FEED: pressing the keys together will abort any process.

8.1.2 Reset

If these two keys are pressed together and the printer is then switched on, all of the configuration parameters stored in the non-volatile memory will be cancelled and the printer restore the parameters preset at the factory (RESET). **Warning – this function must be used with extreme care as it will cancel any special configuration e.g. applicator, cutter etc. etc. This function can result in the loss of certain parameters, which made the product work. Check with the technical support before performing this operation or performing a reset and try and restore the previous settings of the printer.**
The RESET function of the printer can be useful when certain critical parameters are set incorrectly and which prevent the printer from retrieving data from the communication port. It should never be used in other cases.

8.1.3 Recall of a macro

1. *Press the FEED key* for at least two seconds while the printer is ON-LINE and the MACRO Selection function will be accessed. The LINE led and the PRINT led will flash simultaneously.

2. *Press the PAUSE key* and only the LINE led will be on.

3. *Press the FEED key* - once for macro01, twice for macro02,…. Ten times for macro10. Every time the FEED key is pressed the LINE and PRINT led's will switch on and off together.

4. *Press the PAUSE key* -the LINE led will flash rapidly to indicate that the printer is processing data from the macro, which has been recalled. The led will be continually on when it has finished. If a macro, which does not exist, has been recalled the led will not flash and will immediately remain on continually.

If a macro contains the /W command, which determines the number of labels which will be printed, the printer will automatically print those labels after having recalled the macro.

8.1.4 Calibration

This procedure is necessary for all printers, which have a firmware release prior to 2.0. It may also be necessary in some cases where the printer has release 2.0.
The calibration is performed as follows:

1. Disable the autocalibration with the s/$&%----1---------- string, where the hyphens have to be interpreted as of the spaces. The space are necessary. Then /$&% (4space) 1 (11space). Switch off and switch on the printer to verify, on the test label, that the string has been memorized.

2. Switch the printer off , raise the printhead and remove the label roll and ribbon.

3. Press the PAUSE key and switch the printer on. The printer will emit a sound and the green led will flash.

4. Load the label roll and the ribbon in accordance with the instructions contained in the User Manual.

5. Lower the printhead.

6. Press the FEED key to calibrate the length of the label. The printer will register the presence of the ribbon and the length of the label and will stop with the first useable label positioned under the printhead. At this point proceed to the next step.

7. Exit the calibration menu by pressing the PAUSE and FEED keys simultaneously. Align the label in the desired position by pressing the FEED key. Exit this stage by pressing the PAUSE and FEED keys together.

At the end of this procedure the photo sensors for the end paper, end ribbon and label gap are calibrated to detect the presence of paper, ribbon, labels and the backing paper.

9 Auto calibration

The auto calibration function is available on all of the printers in the ST3xx and ST4xx series having a firmware release of 2.0 or later and in the series ST5xx. This function enables the printer to use virtually any type and size of monocromatic(only one color) label without any need to calibrate the printer. The printer analyses the type of paper and ribbon used and sets the parameters for the sensors automatically. Any change of label roll will automatically result in the printer recalculating the parameters to be used. Other than setting the values for the sensors, the auto calibration routine will also correctly position the label so that the printing can start on the leading edge of the label. If the label dispenser mode has been selected for the printer, it will automatically set itself so that the printable

area of the label is maximised whilst taking into consideration the pressure of the printhead on the rubber roller.
Cases where the auto calibration is advisable:

- ✓ Whenever the windows driver is used. Label rolls can be changed easily without having to change the settings of the printer.
- ✓ When the user is not familiar with the Leptons printer and wants to use it quickly.
- ✓ When label rolls are frequently replaced.

Cases where the auto calibration should be inhibited (see the /$&% command)

- ✓ When the label has pictures near to the gap sensor and the picture interferes with the sensor in such a way that it cannot detect the gap.

In some cases it may be necessary to inhibit the function to automatically align the label only. To do this it is necessary to put a value different to 0 in the /H0000 command. Refer to the instructions for the /H command for further explanations. As a suggestion, it is possible to try by trial and error by setting the parameter as /H0001 and seeing where the label is printed. If it is not in the correct position, the value of /H0010 can be increased in steps until the desired positioning is achieved.

When the auto-positioning function should be inhibited:

- ✓ When the label is too small for the auto-positioning to function.
- ✓ When the label is to be positioned differently to that which would be achieved with the auto-positioning.
- ✓ When the typical fluctuations of the auto-positioning are not acceptable.

The auto-positioning of the label function normally uses a couple of labels before it is correctly aligned and this happens every time a label roll is changed or the printer is switched on. If this is to be avoided the auto-positioning function can be inhibited with the /H command.
.

10 Connection to External Devices

The printers have been specifically developed to give powerful and flexible connections to computers for data and for direct I/O connections to industrial equipment.
The ST3XX series has a serial RS232 on the rear panel.
The ST4XX and ST5XX series has an RS232 and a parallel port.

10.1 Serial

Bi-directional connection to a PC. The transmission speed can be programmed up to 38400 baud. The maximum distance is between 10-15m. Longer distances (hundreds of metres) can be achieved with the Leptons NSA-047/N converter and a twisted telephone cable.

10.2 Parallel

In this case the connection is only in one direction. It is not possible to know the status of the printer (end paper, end ribbon) via the PC. The maximum distance is of a few metres –

only 2 metres with the Leptons parallel cable. The parallel cable is not a standard cable. A faster communication speed is achieved with the parallel connection and this is strongly recommended when the windows drivers are used together with the ST4xx series.

10.3 Network

Used to connect a number of printers to the same PC. The network uses a NSA-047/N converter for each printer as well as one for the PC. The maximum number of printers and/or applicators in a network is 14.

11 Serial communication protocols

The reception channel buffer has an interrupt limit of **65535** bytes (FIFO) which are read in sequence by the Command Interpreter.
On switching on the **RTS** signal remains inactive (negative level) until the initialisation phase is complete. It will then become active (positive level) indicating that the printer is ready to receive data.
The RTS signal is logic high level if the printer is switched on and its reception buffer is not full. If the receiving buffer is full and contains more than 60000 characters, the **RTS** switches to logic low level. The RTS becomes high again when the number of characters in the buffer is less than 50,000.
The margin of 5535 characters is used to avoid the loss of data when the transmission does not immediately stop on the change of the RTS status from high to low.
An **XOFF** character (ASCII **DC3**, code 13 hex, 19 dec) is sent to the printer when the **RTS** is low whereas an **XON** character (ASCII **DC1**, code 11 hex, 17 dec) is sent when the **RTS** is high. This standard (protocol **XON/XOFF**) permits simple connections with three wires, using only **RxD**, **TxD** and **GND** leaving **CTS** and **RTS** open. This is for data that goes from the printer to the PC. The XON/XOFF protocol has not been used for data that goes from the PC to the printer to avoid that, during the transmission of a graphic image, a sequence of bits can be interpreted as an XON or XOFF. Consequently the protocol for the data that goes from the PC to the printer is only controlled by the CTS. For this reason cables with rx, tx, cts, rts, gnd should always be used to make the printers function properly.
The printer stores data received from an external device in its buffer even if it is OFF LINE and will then process it when it is put ON LINE. Even in this case the RTS signal will go low if the printer fills the buffer with more than 60000 characters.
The command interpreter will send a BELL character (ASCII code 7) to the external device if it detects an error in the data received thereby warning the device that the data could be lost. This normally happens when there is a disturbance on the transmission line or if the communication parameters are wrong.
The transmission channel is also cushioned but with a buffer of 4096 characters. If the CTS signal is at the logic high level, the printer will send the character on the line. If instead the CTS is at the logic low level, the character to be sent on the line is put in the buffer. If for any reason during the printing of a batch of 9999 labels, the equipment connected to the line keeps the CTS low, the printer will continue to print and put into the buffer all information relating to P09999, P09999, P09997 etc. This until the buffer is full

(approx. 680 labels) unless the buffer is emptied because the external device raises the CTS. If the cable on the serial is not connected the CTS does not have a clearly defined CTS level.
The **CTS** line is controlled between each character and the transmission will immediately stop when the signal becomes negative.

Note: the printer is normally ready to receive until the buffer is full even when it is printing. However it is possible to configure it (command /$&%) so that the line is busy (RTS low, XOFF) while each label is being printed thereby keeping it free (RTS high, XON) only for a short time between labels. There is also a specific command to keep the printer busy until the reception buffer is empty.

12 Network communication protocols

The communication protocol for the ST3XX, ST4XX and ST5XX printers configured in a network is basically the same as that described in the previous section except for the following differences:
The printer only works in a network if equipped with an NSA-047/N interface together with one installed on the PC.
The transmission in network is through a two pole twisted cable (normally a telephone cable, twisted and shielded for long distances) which connects the computer (with the interface on the serial port) to a maximum of 14 printers and / or applicators. Each interface is galvanically isolated and can reach a distance of hundreds of metres.
The network's half-duplex setting has a master-slave communication protocol where the computer (master) is always the originator of any activity on the line and the printers (slave) only send data when requested.
The RTS and CTS are no longer used to control the data flow which is now exclusively on the XON/XOFF mechanism.
Each printer in the network must have a unique address (shown as the "**>Axx**" parameter printed on the test label), within the range 01 and 14. This is the current maximum number of printers and / or applicators that can be put into a network. The settings for the network address can be done with either the "**CFG400**" or **WinLW** software packages.

When operating in a network (00<address<15), the printer is inactive by default when it is switched on (it does not send any data and ignores data received) until it recognises the appropriate activation sequence which is made up of an ASCII control character equal to its address plus 16 (code 11 to 1F hex, 17 to 31 dec), followed by US-US-NAK (code 1F-1F-15 hex, 31-31-21 dec).

When the printer recognises the activation sequence memorised in the reception buffer and executes the commands which follow the network address, and when the CTS is is raised, it will send on the line all that it has in the transmission buffer including any responses to commands received. It will end the string with a terminator character, an EOT

(ASCII Code 4). It will then activate the receiving buffer and will function as a normal printer with the only difference that any status information received, produced during the printing (or when a status request is processed), will be loaded in the transmission buffer and will not be transmitted until another activation sequence is received. If the transmission buffer is empty when the activation sequence is received, only the EOT will be transmitted.

When the printer recognises an activation sequence addressed to another printer it will inhibit the reception buffer and will ignore the characters until it recognises its own activation sequence.

The master-slave architecture requires a periodic poling of all the printers in the network and in particular for the data being printed. This is to avoid the buffers becoming saturated otherwise the autonomy of each printer is for approximately 500 labels before the printer suspends the printing and waits to be interrogated before emptying the buffer. Furthermore, if a lot of data is to be sent to the printer (more than 60,000 characters), it is best to send the first block of 60,000 characters and then interrogate the printer. When the XON signal is received, this indicates that there are fewer than 50,000 in the buffer and it is therefore possible to send another block of 10,000 characters. The XON should then be tested again and another block of 10,000 can be sent. This process should be continued until all of the data has been sent.

13 Printer control commands

The programming language for the ST3XX, ST4XX and ST5XX series of printers is proprietary to LEPTONS and is not compatible with other printers available on the market.
There are two separate Command Interpreters in the printer – the main one processes the data in the reception buffer as a serial flow of characters (or bytes) and sequentially executes the required actions (FIFO basis) whereas the second one only recognises a limited number of commands (sequences of 4 consecutive control codes) and operates in real time when the characters are received and before they are put into the buffer.
The following sections describe the commands which are recognised by the printer and they are organised in four groups:

- ✓ Control characters
- ✓ Printable characters
- ✓ Commands with absolute priority
- ✓ "/" commands to programme the printer

14 Control characters

The printer processes the following characters as control characters and all the others as printable characters.

14.1 ENQ

Enquiry (05 hex, 5 dec): interrogates the printer for its status. The response from the printer is in the form of an S10000A string (refer to the section on return codes for a detailed explanation of this string).

14.2 BS

Back Space (08 hex, 8 dec): moves the cursor back to the last character received and overwrites it (normally used for accented characters not available in the standard character map).

14.3 LF

Line Feed (0A hex, 10 dec): moves the cursor down, on the basis of the current printing direction, by one step (line) which is determined by the current value of the interline parameter.

14.4 FF

Form Feed (0C hex, 12 dec): prints a label with the current contents of the buffer (equivalent to the /W0001 command). Can be deactivated with the command / $&%.

14.5 CR

Carriage Return (0D hex, 13 dec): moves the cursor to the left, on the basis of the current printing direction, to the initial position of the last /E command.

15 Commands with absolute priority

The printer recognises sequences of 4 consecutive control characters, which represent commands which are immediately executed instead of being stored in the buffer for subsequent processing by the command interpreter. The sequences are the following:

15.1 VT-US-US-NAK

(0B-1F-1F-15 hex, 11-31-31-21 dec) puts the printer into busy status, sets the TRS to negative and sends an XOFF. The printer goes to standby and ready status (RTS positive and sends XON) when all of the pending commands have been processed and are completed (buffer empty). This command is useful when it is necessary to disabilitate the entry buffer.

15.2 SO-US-US-NAK

(0E-1F-1F-15 hex, 14-31-31-21 dec) **Cancels the reception buffer.**

15.3 SI-US-US-NAK

(0F-1F-1F-15 hex, 15-31-31-21 dec) **Aborts the print session in progress,** after having completed the current label. The current label will not be printed if the printer is waiting for variable data. After aborting the current print session, the printer will continue to process any data remaining in the buffer. This command can also be used to cancel the processing of a sequence of pending commands thereby immediately putting the printer into a status of ONLINE.

15.4 DLE-US-US-NAK

(10-1F-1F-15 hex, 16-31-31-21 dec) **Emulates the PAUSE key,** putting the printer into **ONLINE/OFFLINE** status or PAUSE/RESUME of a print session.

16 Printable characters

The printer interprets all the codes between 20 hex (32 dec) and FF hex (255 dec) as printable characters except for 2F hex (47 dec). This corresponds to the "/" character which is seen as the start for a series of commands (the sequence of "//" is used to print the character "/").

The "/" command can be reassigned to a different printable character or a control character if necessary. This obviously results in the loss of communication between the printer and any of the LEPTONS software packages.

The 96 characters from **SPACE** (20 hex, 32 dec) to **DEL** (7F hex, 127 dec), corresponding to the standard ASCII codes are immediately available. This is due to the fact that the position, the ASCII DOS code and the ASCII WINDOWS code are all aligned as shown in the following table:

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Position	Character	Code Ascii DOS	Code Ascii Windows
32		32	0032
33	!	33	0033
34	"	34	0034
35	#	35	0035
36	$	36	0036
37	%	37	0037
38	&	38	0038
39	'	39	0039
40	(	40	0040
41	)	41	0041
42	*	42	0042
43	+	43	0043
44	,	44	0044
45	-	45	0045
46	.	46	0046
47	/	47	0047
48	0	48	0048
49	1	49	0049
50	2	50	0050
51	3	51	0051
52	4	52	0052
53	5	53	0053
54	6	54	0054
55	7	55	0055
56	8	56	0056
57	9	57	0057
58	:	58	0058
59	;	59	0059
60	<	60	0060
61	=	61	0061
62	>	62	0062
63	?	63	0063
64	@	64	0064
65	A	65	0065
66	B	66	0066
67	C	67	0067
68	D	68	0068
69	E	69	0069
70	F	70	0070
71	G	71	0071
72	H	72	0072
73	I	73	0073
74	J	74	0074
75	K	75	0075

76	L	76	0076
77	M	77	0077
78	N	78	0078
79	O	79	0079
80	P	80	0080
81	Q	81	0081
82	R	82	0082
83	S	83	0083
84	T	84	0084
85	U	85	0085
86	V	86	0086
87	W	87	0087
88	X	88	0088
89	Y	89	0089
90	Z	90	0090
91	[	91	0091
92	\	92	0092
93	]	93	0093
94	^	94	0094
95	_	95	0095
96	`	96	0096
97	a	97	0097
98	b	98	0098
99	c	99	0099
100	d	100	0100
101	e	101	0101
102	f	102	0102
103	g	103	0103
104	h	104	0104
105	i	105	0105
106	j	106	0106
107	k	107	0107
108	l	108	0108
109	m	109	0109
110	n	110	0110
111	o	111	0111
112	p	112	0112
113	q	113	0113
114	r	114	0114
115	s	115	0115
116	t	116	0116
117	u	117	0117
118	v	118	0118
119	w	119	0119
120	x	120	0120

121	y	121	0121
122	z	122	0122
123	{	123	0123
124	|	124	0124
125	}	125	0125
126	~	126	0126
127		127	0127

Of the other characters, only the following are available:

Position	Character	Code Ascii DOS	Code Ascii Windows
0	Ä	142	0196
1	Ö	153	0214
2	Ü	154	0220
3	Å	143	0197
4	Æ	146	0198
5	Ø	157	0216
6	È	144	0201
7	ß	225	0223
8	Ñ	165	0209
9	ä	132	0228
10	ö	148	0246
11	ü	129	0252
12	å	134	0229
13	æ	145	0230
14	ø	155	0248
15	ç	135	0231
16	¿	168	0191
17	ñ	164	0241
18	à	133	0224
19	è	138	0232
20	ù	151	0249
21	ì	141	0236
22	Ç	128	0199
23	î	140	0238
24	ò	149	0242
25	°	248	0176
26	è	130	0233
27	í	161	0237
28	µ	230	0181
29	¡	173	0161
30	£	156	0163
31	Þ	232	0167

It is evident that there is no alignment between the DOS and WINDOWS ASCII codes for these characters. The alignment is achieved through an allocation table which assigns to

each character in the n.th position the corresponding ASCII code. For this reason there are two different tables for DOS and Windows.
Both of the tables are called MAPIBM and are sent to the printer by the LEPTONS LW-DOS and WinLW programmes via the /Y command.

FONTS
There are two types of font – fonts that are stored in the EPROM of the printer and fonts that can be loaded from external sources and which will still be treated as being resident in the printer. The fonts resident in the EPROM are recalled directly by the command interpreter when printing. However the Magnum, Mega, all of the proportional fonts, Helvetica and, for the ST400, the Arial and Courier, must first be put into the RAM in order to be used. This is because the command interpreter looks for them in the RAM. For this reason any label which uses these fonts must contain the command to transfer them from the eprom to the ram otherwise they will not be printed. The command to search for these fonts in ram is /T1 and in eprom is /T0.

The characters are designed in the printable area using as a starting point the bottom left corner of the character for capital letters in the case of alphanumeric fonts or the bottom left corner of the matrix of the character in the case of font 3 (symbols).

The character size, orientation and design mode are dependent on the current values in the parameters controlled by the /F and /R commands.
The cursor moves automatically in the appropriate direction after putting it in (according to the print orientation selected) by the distance determined in the "pitch" parameter which has a default value for every font and can be changed with the /X command.

The space character is the same for all the characters for fonts in EPROM (fixed spacing), but can be different for every character in the case of RAM fonts (proportional spacing) if the appropriate tables are loaded through the /I command.
"/" Sequences
As mentioned above, "/" is used as a command header to maintain compatibility with the ST230, but any other ASCII code, including control codes, can be used instead on the ST3XX, ST4XX and ST5XX series. All references in this section consider the default value valid and assign "/" as a command header.

Note: the "/" character is only interpreted as command header when the printer is processing commands and printable characters normally. When the printer is processing characters received to fill a string for a barcode or variable text field created with a /I2 command, the "/" is interpreted as a printable character and does not need to be sent twice.

17 The "/" command to programme the printer

All printer commands must start with the character "/" unless this has been replaced by another character. It is strongly recommended that this character is not changed unless exceptional circumstances require it.

17.1 //

the "**//**" command is used to print the "/" character. Generally a command header immediately followed by another command header will treat it as a printable character.

17.2 /!

The **/!** Command is used for a single cut of the cutter (if the printer has the option installed) without moving the paper.

17.3 /#

The **/#** command is used to feed a blank label (or a predetermined amount of paper) without influencing the current contents of the memory. The paper movement is the same as that achieved with /C/W0001 but it does not cancel the memory. It is therefore possible to print the label in memory without resending the entire label a second time.

17.4 /@

The **/@** command is used to set all the internal counters associated to variable data (if present) to the original zero state. It must be used if multiple prints of the same label are required (containing variable data and an update step greater then 1) and must always be placed immediately before the second and subsequent /Wnnnn command.

17.5 /$&%nnnnnnnnnnnnnnnn

The **/$&%** command is used to store the current values of the parameters in the non-volatile memory. It is also used to activate or inhibit certain function. Activation or inhibition is achieved by putting "0" or "1" respectively in the position corresponding to the function. Each of the positions in the "nnn……nnnnnnn" string which follows /$&% represents a set function. The functions and their position in the string are as follows:

	ST3XX	ST4XX, ST5XX
1	Download in ROM proportional fonts	Parallel port
2	not used	Controls print energy
3	Eeprom reset from panel.	
4	Photo sensor calibration from panel	
5	Autocalibration	
6	Reduces print speed when printhead temperature exceeds 55°C	Signal Error when pallet missing in AP406 AP516 cycle
7		End paper sensor
8	Printhead switch control	
9	Goes to standby when print session finished.	
10	Goes to standby after each label printed.	

11	Prints with FEED key(only blank label)	
12	Prints test label on switch-on.	
13	Return message when ENQ recognised.	
14	Sends XOFF and sets the printer to busy when it prints or is OFF-LINE	
15	Messages of return and management FORM FEED	
16		Controls product photo sensor detector

It is possible to use a space as instead of "0" and "1". In this case the function of that position remains the same as that before using the /$&% command.

All of the values of the parameters seen on the test label which is printed on switch-on are permanently stored in the non-volatile memory by using this command.

These values are used as default when the printer is switched on and can be changed by the relevant commands sent by an external computer. The new values are temporary (i.e. lost when the printer is switched off) unless they are stored with this command.

Note: the non-volatile memory is an EEPROM guaranteed for approx. one million writing cycles. For this reason the /$&%…command should not be improperly used otherwise it will prematurely age the EEPROM.

17.6 /$%&

The **/$%&** command (EEPROM reset) è used to restore all the parameters of the non-volatile memory back to the factory settings. It has the same function as the manual procedure of pressing the PAUSE+FEED keys when the printer is switched on.

17.7 /$>Ann

The **/$>A** command is used to assign a network address to the printer. The LEPTONS printers can be networked with LEPTONS LW DOS and WINLW programmes. The network is linked with NSA-047/N adaptors, one on each serial of the printers and one on the PC. The connection between the adaptors is made with a twisted and shielded telephone cable.

The command must be followed by two digits which represent the printer's unique address (from 01 to 14) in the network. When the address is set to 00 the printer is configured to not work in a network.
The printer will not respond to commands via the serial port unless it is properly configured. Read the section entitled "Network communication protocols".

17.8 /$>Bbdps

The **/$>B** command is used to configure the serial interface communication parameters.
It must be followed by 4 parameters in the following sequence:

b	speed, 1 digit (0=38400, 1=19200, 2=9600, 3=4800, 4=2400, 5=1200, 6=600, 7=300 baud);
d	Number of data bits, 1 digit (allowed: 7 or 8);
p	parity, 1 character (N=no, Z=zero, O=odd, E=even);
s	Stop bit , 1 digit (1 or 2).

It is not necessary to memorise the command.

Note: when the serial parameters are changed with this command it is necessary (in any old versions of firmware) to switch the printer off and then on again to implement the changes.

17.9 /$>Ch

The **/$>C** is used to change the character "/" used as the identifier for the start of a programming command for another character.

It must be followed by a single character which represents the new header for the commands (allowed values: any ASCII or extended ASCII code from 0 to 255).

For uniformity with the ST230 printer, the "/" character is factory set as default header and this manual is based on this character.

Note: when the command header is changed with this command it is necessary to switch the printer off and then on again to make the change effective.

17.10 /$>Ln00

The **/$>Ln00** is used to select the language for the date format.
It must always be followed by the following parameters:
n 0 = Italia, 1 = English , 2= Franch
00=not used, always set to 00

17.11 /$>Ohhmmssggmmaaaa

The **/$>O** command is used to change the time and date.
The command must always be followed by 6 parameters in the following order:

hh **hour** (values:00 a 23)
mm **minutes** (values :00 to 59)
ss **seconds** (values:00 to 59)
gg **day** (values: 01 to 31)
mm **month** (values: 01 to 12)
aaaa **year**

17.12 /$>Paaabbbcccpppprrr

The **/$>P** command is used to change the sensitivity of the sensors for label gap, end paper and end ribbon. This parameter is indeed used by the printer it is disabled the autocalibration. In the contrary case the printing treadle of time in time the more suitable value.

The command must be followed by 5 parameters in the following order:

aaa	Sensitivity of transparency sensor (/K1), 3 digits, values from 000 to 255
bbb	Not used in ST3xx series (always set to 255). Sensitivity of lateral transparency sensor in ST4xx, ST5xx series, 3 digits, values from 000 to 255
ccc	Always refers to the same sensor in the ST3xx series but can be used to memorise a different level to function with black mark labels. In the ST4xx, ST5xx series, relates to the level for the specific black mark reflective sensor 3 digits, values from 000 to 255
ppp	End paper sensor. 3 digits, values from 000 a 255 (255 deactivates the sensor)
rrr	End ribbon sensor. 3 digits, values from 000 a 255 (255 deactivates the sensor)

The actual significance of these values depends on the specific parameter.
For the label transparency sensors, if the value read is higher than the level memorised in /$>P….., a gap between one label and another is considered.
The label reflective sensors, consider a gap between the black mark when the value read is lower than the limit.

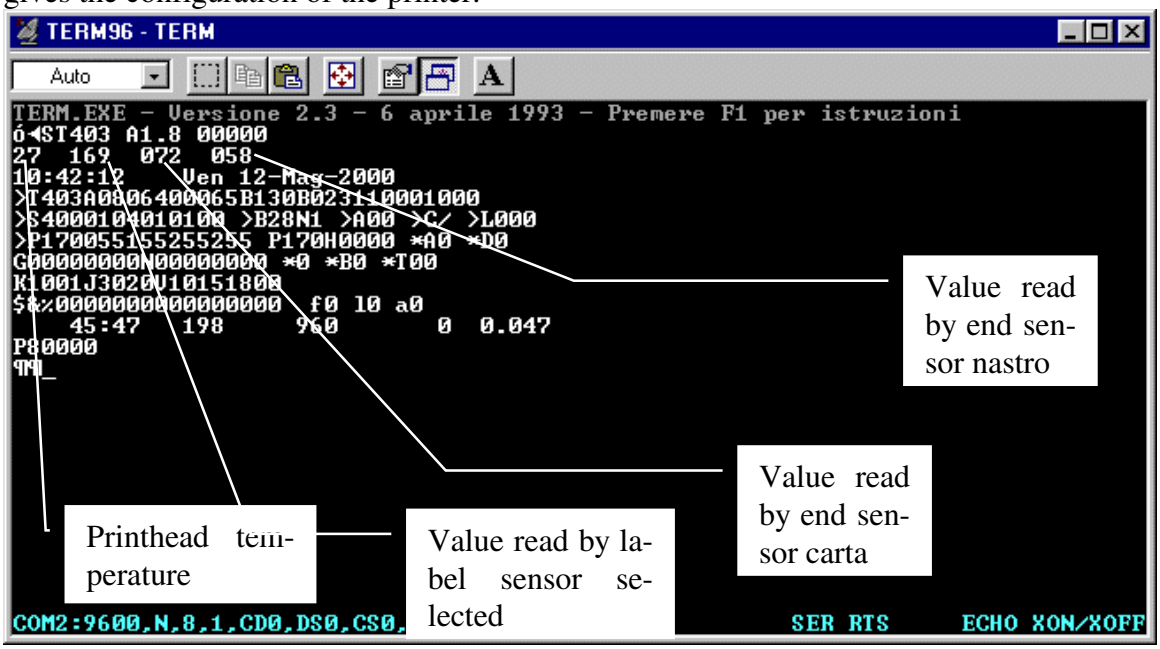
Paper and ribbons are considered present when the values read by the respective sensors are lower than the relative limits.
The ST3xx series only have one sensor whereas the ST4xx, ST5xx series have 3 distinct sensors:
Lateral transparency sensor- reads from one side of the label K2…..
Central transparency sensor – reads in a more central position of the label K1….
Reflective sensor – reads in a lateral position K3…..

Sensitivity parameters are factory set during the initial quality control and their values can vary between one printer and another because of the tolerance of the sensors. If the paper or ribbon is significantly different to that used in the factory, one or more of these parameters may need adjusting.

Series ST3xx and ST4xx, ST5xx printers with a firmware release of 2.0 onwards have an auto calibration function. In this case the values for the sensors are calculated automatically for every print session. The values memorised in the parameter /$>P are therefore not used.

Pre-printed labels with particular shapes or colours can generate misleading values for the auto calibration function or in the calibration procedure and the values should be calculated manually. This procedure is possible by connecting the ST3xx or ST4xx, ST5xx to a PC which has a terminal emulation programme. LEPTONS supplies its own TERM.EXE
.

After correctly configuring the communication port (usually 9600,8N1), connect the printer to the serial port of the PC with the cable supplied with the LEPTONS LW-DOS or WinLw software package (this manual also contains the specifications for this cable) when the printer is switched on the following text will appear on the screen and which gives the configuration of the printer.



The printer should be witched off and then on again for it to send its configuration to the PC or alternatively send the /U00 command. Every time that the /U00 command is sent to the printer it responds by sending its own configuration.
The picture above shows the values read by the various sensors. To ensure that the readings give useful information, the sensors should always be surrounded by the same environment. If, for example, the values for the paper and backing paper are required for the selected sensor, the printhead should be raised and the backing paper positioned by the selected sensor. To make this easier, one or two labels should be removed from the backing paper to have a larger area of the backing paper exposed which then makes it easier to position it by the sensor. The /U00 command should then be sent to the printer and the value read. Let us assume that the value is 200. Now position the label by the label sensor and, ensuring that the printhead is still raised, the /U00 command is sent to the printer. The value, which is in the same position as before, should now be read for the label sensor. This time the value will be lower – in the region of 060. In this example the value of the label gap should be in between these values i.e. (200-60)/2 +60 =130.This value is then recorded in the first position for the command /$>P130…… The same operation is repeated for the end paper and end ribbon sensors.

17.13 / $>Tiiihbbbyyyyffffmmmmnnnntttpppp

The **/$>T** command is used to set certain parameters regarding the identification of the printer and the memory configuration. It is advisable to not change this parameter.
If this parameter is changed incorrectly it is possible that the printer will have some difficulties on switch on which can then not be easily resolved.

The command must be followed by 9 parameters in the following order:

iii	Printer identification, 3 digits (values from 140 to 406)
h	Printhead type in reply to status request command , 1 character (recommended: **A** for ST403, **B** for ST406, **C** for ST302/ST312, **2** for ST314)
bbb	Width of bitmap in bytes, 3 digits (values: from 020 to 999, 104 for ST314)
yyyy	Height of bitmap in dots, 4 digits (values: from 0000 to 9999, depending on quantity of RAM memory installed on the printer)
ffff	
mmmm	
nnnn	
tttt	
pppp	

These parameters are normally only set once in the life of the printer – at the factory. They should not normally be reset unless special situations arise e.g.installation or removal of memory expansions or if a particular optimisation of the memory is required.

*17.14 /*Ax solo ST4xx ST5xx*

This command is used to activate or deactivate the applicator.

x=0	**Applicator not activated**
x=1	**AP403 AP514(normal, variable or fast)**
x=2	**AP406 AP516**

*17.15 /*Bn*

The **/*Bn** command is used to choose between single or double bitmap configuration.
The command must be followed by the following parameters:

n=0	**single bitmap**
n=1	**double bitmap**

The single bitmap is useful when very long labels must be printed and which require a large amount of memory.
The double bitmap is used when a faster processing speed is required. In this case, half of the memory is dedicated to the processing of the next label.

*17.16 /*Dx solo ST4xx ST5xx*

This command is used to choose between single or double application with the AP406 applicator.

x=0	**Double application Left/Right**
x=1	**Double application Right/Left**
x=2	**Single application Left**
x=3	**Single application Right**

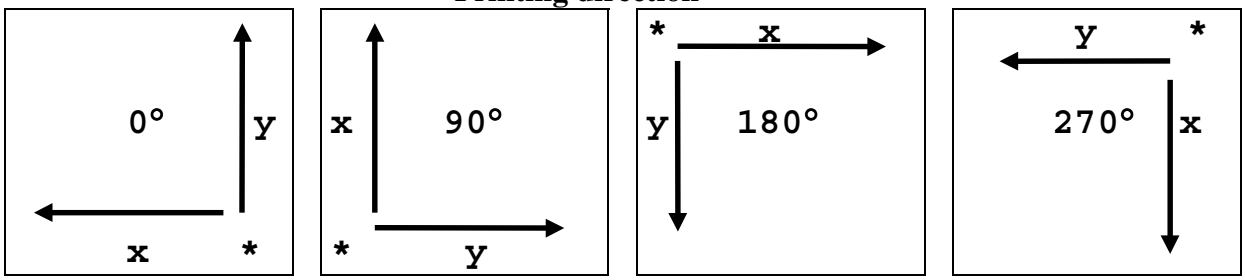
*17.17 /*Txx solo ST4xx ST5xx*

The following command sets the delay time before the photo sensors on the applicator plate are read. The time starts from the moment the label has been printed and is expressed in seconds.
Example: *T01 means that the label has been printed and that the applicator arm has started its movement and that the photo sensors on the plate will be read after one second.

*17.18 /*Oo*

The **/*O** command is used to rotate the print in relation to the label and must be followed by a single parameter which defines the orientation (values: from 0 to 3).
Orientation of 0 maintains compatibility with the ST230, (default value).
The label is printed in reverse if 2 is selected whereas 1 and 3 will rotate the printing by 90° in a clockwise or anticlockwise direction respectively.

Printing direction



- : 0,0 coordinate

The test label is always printed with a rotation of 0.

17.19 /a – Only for ST4xx ST5xx

The /a command is only used by the ST400 series and is used to configure the output signal for an industrial interface. This is the SYNC signal.
/a0 => Sync with transition from one application cycle and another.
/a1 => Sync without transition from one cycle and another but only at the beginning and end of the batch of application cycles.

17.20 /Awrc

The **/A** command is used to configure the attributes of the barcode: thickness of bars, presence or not of legible characters and the bar guard.
It must be followed by 3 parameters, each of 1 digit, which have the following significance:

w	Width of narrow element in dots, equivalent to 1/8 of a mm. (from 1 to 8)
r	Ratio between large elements and the narrow ones of the barcode. Only relevant to Code 39, Interleaved 2/5 and Codabar (values: **1** = ratio 2:1, **2** = ratio 2.5:1, **3** = ratio 3:1)
c	Sets presence of characters under barcode or not and the guard bar in accordance with the following table:

c value	characters	guard bar
0	**no**	**no**
1	**no**	**yes**
2	**yes** Vexp=1	**no**
3	**yes** Vexp=1	**yes**
4	**no**	**no**
5	**no**	**yes**

6	**yes** Vexp=2	**no**
7	**yes** Vexp=2	**yes**

If the characters under the barcode are present, the fonts used for the print depend on the parameter used for the width of the bars:

w=1 the small font will be used
w=2 or **w=3** gives the normal font
w=4, **5**, **6, 7** or **8** gives the large font.

The horizontal expansion factor is set to 1 whereas the vertical expansion factor is:

1 for **c=2**, **3**
2 for **c=6**, **7**.

17.21 /Bthhhc..ce

The **/B** command is used to insert a barcode with its top left hand corner in the position of the last **/E** command and in the direction of the last command for **/R**.

It must be followed by 2 parameters, followed by the string for the barcode and a terminator as in the following example:

t type of barcode. Only one character. Following values allowed:

0	**EAN13**
1	**EAN8**
2	**UPC-A**
3	**CODE39**
4	**INTERLEAVED 2/5**
5	**CODABAR**
6,7	**ADD-ON for EAN/UPC (2 and 5 digits respectively)**
A,B,C	**CODE128, character sets A, B and C respectively**
a,b,c	**EAN128, character sets A, B and C respectively**

hhh height of barcode expressed in dots, equivalent to 1/8 of mm, three digits (from 008 to 999).

c.. c sequence of characters of the code, variable length (from 1 to 40 characters) depending on the barcode type chosen (all valid characters for the type of barcode chosen are accepted, the first invalid character is interpreted as a terminator)

e terminator of the sequence. Can be any invalid character for that type of barcode chosen (normally carriage return except for CODE128/EAN128 A where CR is a valid character).

The following is a brief description of the rules for the various barcodes available:

EAN13 Any numerical digit is valid (from **0** to **9**). If 12 numbers are input, the check digit will be automatically calculated and placed in the 13th. position. If 13 digits are input, the checksum will be checked and the barcode will be printed if it corresponds to the 13th position.

EAN8 Same rules as EAN13, but with 7 or 8 digits.

UPCA Same rules as EAN13, but with 11 or 12 digits.

CODE39 The valid characters are the 26 CAPITAL letters of the alphabet /from A to Z), the 10 numbers (from 0 to 9), the space and the following special characters - **. $ / + %** * @ **.** The asterisk (*) is used as delimiter of the sequence and must be put at the beginning and at the end. However the code can be printed even if the asterisk is missing. The symbol (@) is used to indicate the module 43 check-digit and, if required, should be placed at the end of the sequence immediately before the final delimiter. The maximum length of the sequence is of 40 characters.

INT.2/5 Valid characters are the 10 numerical digits (from 0 to 9). Usually an even number of digits (from 2 to 40) can be used. This is due to the structure of the barcode in that an uneven number of digits will lead to a final checksum digit (calculated under the ITF rules) being calculated and placed at the end of the barcode. Suitable delimiters are automatically added to the beginning and the end of the sequence.

CODABAR The numerical digits (from 0 to 9) and the following characters are valid:

ABCD
abcd
tn*e
$+-./:

The first 3 groups of 4 characters are normally used as delimiters and produce the same effect (**A=a=t, B=b=n** etc.). The code can be printed without lead/terminator characters. The last group of 6 characters can be used to include non-numerical information and/or supplementary data in the sequence. The maximum length is of 40 characters and no check digit calculation is performed.

ADD-ON This code can only be used in conjunction with EAN-13, EAN-8 or UPC-A and is used to extend the number of digits in the barcode with an additional 2 or 5 numbers. The ADD-ON must always be placed to the right of the principal symbol, leaving sufficient space between them so that the scanner can recognise the combination of the two. A check digit is automatically added to the barcode but it does not require any space and is not visible.

CODE128 This is a more complex code and recognises three different sets of characters. Uses the complete 128 ASCII character set **: set A** includes ASCII codes from 0 to 95, **set B** includes ASCII codes from 32 to 127, whilst **set C** is used for double density (the resulting dimension is one half of that which would be achieved with **SET A** or **B**) and codes for numerical characters (2 digits are seen as one single character). The maximum length is of 40 characters. Delimiters (start and end) and checksums are automatically added to the barcode as they are an integral part of the structure. The printer also recognises other special function codes which are not part of the ASCII character set. These special characters are used to make up a mixed barcode. An example is for a bar-

code where numerical and alphabetic characters coexist and where it is possible to assign to the numerical part a code as in **SET C** and to the alphabetic characters a code as per **SET A**. This maximises the compression of the barcode i.e. it becomes shorter. The following table gives the special characters:

Extended ASCII codes	Function
128	**FNC 3**
129	**FNC 2**
130	**SHIFT**
131	**SET C**
132	**SET B**
133	**SET A**
134	**FNC 1**

EAN128 This is a variation of CODE128. It follows the same rules as described above with the difference that it automatically inserts the special character **FNC1,** immediately after the initiator character. This means that the EAN128 is always a little longer than the equivalent CODE128.

17.22 /C

The **/C** command is used to empty the buffer of the printer. All the fields are removed and the parameters are reset to the following default values:

font = normal
source = EPROM (fixed spacing)
horizontal expansion = 1
vertical expansion = 1
interline = 20
pitch = 12
horizontal position of cursor = 0
vertical position of cursor = 14
rotation = 0
mode = 0 (black)
thickness of barcode = 2
ratio of barcode = 2 (2.5 a 1)
barcode string bar guard = 1 (string present, guard bar absent)

The **/C** command is used before another label is printed.

17.23 /Exxxxyyyy

The **/E** command is used to position the cursor which will be used as the starting point for the insertion of any object or bitmap.

It must be followed by 2 parameters, each of 4 digits, with the following significance:

xxxx horizontal position in dots (values: from 0000 to XMAX);

yyyy vertical position in dots (values: from 0000 to YMAX).

The upper limits XMAX and YMAX mentioned above depend on the size of the bitmap and the current position.

17.24 /Ffhv

The **/F** command is used to select the font style and the expansion factor.

It must be followed by 3 parameters which identify the desired font and the associated expansion factor in the following way:

f identification of font, 1 character

from 0 to 6	**ST3xx**
from0to 6and from A to T	**ST4xx ST5xx**

h horizontal expansion factor (values: from 1 to 9);
v vertical expansion factor (values: from 1 to 9).

These selections are temporary and are lost when the printer is switched off.

The following table shows the geometrical characteristics of the fonts from 0 to 6 which are compatible with those available on the ST230 printer (all values are in dots).

GEOMETRICAL CHARACTERISTICS						
Font Identifier	**0**	**1**	**2**	**3**	**5**	**6**
Font name	**small**	**normal**	**big**	**symbol**	**magnum**	**mega**
Matrix width	**8**	**16**	**24**	**32**	**56**	**96**
Matrix height	**9**	**18**	**36**	**32**	**70**	**120**
Character width	**5**	**10**	**20**	**n.a.**	**39**	**67**
Character height	**7**	**14**	**28**	**n.a.**	**52**	**72**
Default pitch	**6**	**12**	**24**	**32**	**56**	**96**
Default interline	**10**	**20**	**40**	**32**	**70**	**100**

These fonts are resident on the ST3xx and ST4xx printers. The ST4xx series also has the following fonts :

ID	Font name	interline
A	**Arial Bold 4 pts**	**19**
B	**Arial Bold 5 pts**	**24**
C	**Arial Bold 7 pts**	**34**
D	**Arial Bold 8 pts**	**38**
E	**Arial Bold 9 pts**	**45**
F	**Arial Bold 12 pts**	**59**
G	**Arial Bold 16 pts**	**78**
H	**Arial Bold 20 pts**	**96**
I	**Arial Bold 24 pts**	**105**
J	**Arial Bold 32 pts**	**153**
K	**Courier Bold 4 pts**	**20**
L	**Courier Bold 5 pts**	**23**
M	**Courier Bold 7 pts**	**33**

N	**Courier Bold 8 pts**	**37**
O	**Courier Bold 9 pts**	**43**
P	**Courier Bold 12 pts**	**56**
Q	**Courier Bold 16 pts**	**76**
R	**Courier Bold 20 pts**	**92**
S	**Courier Bold 24 pts**	**104**
T	**Courier Bold 32 pts**	**150**

Note: the expansion factors are assigned to the character independently of the orientation. There is a limit on the expansion determined by the paper width. The values from 1 to 8 are recognised correctly whereas 9 is treated as an 8.

17.25 /Gxxxxyyyy

The **/G** is used to position the origin of the coordinates.

It must be followed by two parameters each of 4 digits with the following significance:

xxxx horizontal position in dots (values: from 0000 to Width);

yyyy vertical position in dots (values: from 0000 to Length).

The maximum values of Width and Length depend on the dimensions of the bitmap (fixed by the 3rd and 4th parameters of the **/ $>T** command) and the orientation of the label (fixed by the command **/ *O**).

Note: when this command is executed, the position of the cursor will be the new origin and the subsequent use of the /E command will refer to that origin.

17.26 /Hnnnn

The **/H** command is used to control the alignment of the label under the printhead, if the label sensor is active, otherwise it will control the spacing between prints when continuous paper is used. A value in H which is different to 0 in version 2.0 onwards will deactivate the auto positioning of the label.
With H0000 and the autocalibratione, the label will come set automatically in the point more correct to maximize the area of print. If you wants correct this location you may act on the first 4 digit of the /G command.

With H0010 and the autocalibration the label will come set with the gap to 10 pass from the sensor.
If the autocalibration is disabled H number represents the distance in pass between the gap and the sensor.

The /H command must be followed by a 4 digit number, expressed in dots (values from 0000 to 9999). It defines the number of passes for the motor must still do after identifying the gap.

17.27 /Iv...

```
/I0
/I1nv.. vmqqss
/I2ssssnnc.. c
/I3sssssthhhc.. ce
/I4ssssbbbllll
/I5ssssnncc.. c
```

The **/I** command is used to insert a variable field in the current position of the cursor.
The parameter **v** (values: from 0 to 5) after the **/I** command specifies the type of variable field and determines the configuration of the parameters as follows:

17.27.1/I0

Does not require other future parameters and is used to input the temperature of the printhead expressed in degrees Centigrade (Celsius). The printhead temperature is read before every print and its value is updated automatically.

17.27.2/I1nv.. vmqqss

Used to insert a numerator – a numeric field which updates itself.

n	Number of digits in numerator
v	Starting value for numerator in **n** digits
m	0 increases the numerator and prints in black (°) 1 decreases numerator and prints in black 2 increases numerator and prints in white (^) 3 decreases numerator and prints in white
qq	Value of increase or decrease
ss	Frequency of update i.e. every **ss** labels

(°): prints in black. Black in the case of direct thermal otherwise the colour of the ribbon used when in thermal transfer.
(^): prints in white. If the numerator is superimposed on an object (line, box, barcode,etc) all the parts superimposed will appear in white.

17.27.3/I2ssssnnc.. c

This is used to insert a "remote" field of text, represented by the sequence **c.. c**, made up by **nn** (2 digits, 01 to 99) characters which the external computer must send to the printer every **ssss** labels printed (4 digits, 0001 to 9999).

Control characters (e.g. CR or CR+LF) can be used as field separators to allow for shorter text sequences. In this way the printer will complete the string received up to the length of **nn** with blank characters.

17.27.4/I3ssssthhhc.. ce

Is used to insert a "remote" barcode sent by an external computer every **ssss** labels printed (the other parameters **t**, **h**, **c**, **e** follow the same rules as the parameter **/B**).
The text containing the barcode must always be ended with a null character as is normally done with the command **/B**.

17.27.5/I4ssssbbbllll

Is used to insert a "remote" graphic field sent by an external computer every **ssss** labels. See the instructions for the **/Q** command for details regarding the parameters **bbb** e **llll**.

17.27.6/I5ssssnncc.. c

Is used to insert a date/hour field whose contents must be sent by an external computer every **ssss** labels, where **nn** represents the length of the field (max. 10 characters). **cc.. c** has the following structure:

y	**=** year xx	**ex. 95**
Y	**=** year xxxx	**ex. 1995**
m	**=** month [x]x	**ex. 1**
M	**=** month xx	**ex. 01**
O	**=** month in letters in selected language (Command **/ $>L**)	**ex. Gen**
d	**=** day [x]x	**ex. 1**
D	**=** day xx	**ex. 01**
o	**=** day of the week in selected language (Command **/ $>L**)	**ex. Lun**
h	**=** hour [x]x	**ex. 1**
H	**=** hour xx	**ex. 01**
Io	**=** minutes xx	**ex. 23**
S	**=** seconds xx	**ex. 25**
w	**=** number of week [x]x	**ex. _1**
W	**=** number of week xx	**ex. 01**
p	**=** number of the day [xx]x	**ex. __1**
P	**=** number of the day xxx	**ex. 001**

It is possible to have up to 99 variable fields in a label, mixed in any combination.

If the variable fields designated as "remote" are included in the label, the external computer must send the actual contents of these fields immediately after the print command. Such fields must be sent in the same order as that in which they have been inserted in the label.

The printer waits for the variable fields from the computer and prints the label only when all the required characters (or bytes) have been received.
The computer can also send the complete string of the necessary variable data for the printer for an entire batch of labels. Such data is buffered automatically by the printer and are recovered as necessary. The computer does not necessarily remain busy for the printer during the printing of the batch (unless the total quantity of the variable data exceeds the capacity of the buffer).

Note: in the case of variable text (/I2), when the printer recognises the back-space control character (ASCII code 8), it prints small accented letters and letters not included in the font with the sequence : accent+BS+letter (this sequence of 3 characters is valid for only 1 character in the field length). This characteristic is for compatibility with the ST230, but is not otherwise necessary because the new fonts of the ST314 have a larger international character set with accented letters.

17.27.7/I6nndd..dssssthhhccc...ce

Is used to insert date and time from the printer's internal clock into a barcode. The command format is as follows:

/I6nndd..dssssthhhccc...ce

nn	Is the length of the string dd...d which describes the format of the date and time (see command /I5).
dd..d	Is the string which describes the format of the date and time (see command /I5).
ssss	Is the update frequency for the labels (see command /I3).
t	Is the type of barcode (see command /I3 – all are valid except add-on 6 and 7). Warning: the type selected must be consistent with the selected date/hour string format (example – if the day of the week is to be printed in a literal format, it is necessary to select a barcode which supports the printing of alphabetic characters in small print. Also ensure that the maximum length of the string is supported by the desired barcode).
hhh	Is the height of the bars in dots /see command /I3).
ccc...c	Defines the barcode length. Input a string of the same length as the date/hour string previously defined in dd...d. It is important to insert the correct length because the printer will use this data to clear the area of the barcode before updating it with the subsequent barcode data (see command /I3).

Sample label :

```
/*O1/V06      /K0700/H0050/C
/E00000010/M05450450010
```

```
/E00300060/F211/I5000105H:I:S
/A223
/E00300080/I605HIDMY000100700000000000000Û
/E00300170/I603HIS0001104000000000Û
/E00300250/I607*H.I.S*00013040*HH.MM.SS*Û
/E00300310/I607o d O Y0001B040***************Û
/E00300370/I607o d O Y0001b040***************Û
/E02700080/I603HIS000140700000000Û
/E02700170/I603HIS000150400000000Û
/E03300250/I603HIS000190400000000Û
/R1 /E05200080/I603HIS000240700000000Û
/R0 /E00300444/I1300000101
/W0004
```

17.28 /Jhhss

The **/J** command is used to set the shape ratio. The most suitable value to obtain a scale of 1:1 in the X and Y axes is memorised in the default configuration of every printer. This parameter can be changed for special applications where it is necessary to change the printing roller or the paper feed settings.

It must be followed by 2 parameters, each of two digits with the following significance:

hh printhead cycle / period (values: from 01 to 99);

ss motor feed passes / period (values: from 01 to 99);

The speed of the paper is inversely proportional to the parameter **ss.** The shape ratio is determined by the ratio between **hh** and **ss**. If the value of these two parameters is correct, the printing of a square should give exactly the same length sides.

17.29 /Kpdet

The **/K** command is used to define the operation mode of the printer.

It must be followed by 4 single parameters having the following significance:

p continuous paper / die-cut labels / black mark (values : from 0 to 3).

	ST3xx	***ST4xx ST5xx***
0	Continuous paper	Continuous paper
1	Die cut labels	Lateral transparency photo
2	not supported	Central transparency photo
3	Black mark	Reflective photo

d label dispenser photo / applicator (values: 0,1,3,4);

	ST3xx	***ST4xx ST5xx***	
		Synchronism	***Polarity***
0	No dispenser	Applicator	Low active
1	Yes dispenser	Print	Low active
4		Applicator	High active
5		Print	High active

The “d” parameter in the ST3xx series is used to activate the dispenser. If the dispenser is active, the next label will not be printed until the printed label has been removed.
In the ST4xx series however, the "d" parameter is used to configure the applicator functions.
Synchronism on the applicator – means that the printer, independently to the package presence sensor, will print the label which is to be applied. The applicator will collect the label and advance the plate. The applicator will stop in this position and will wait for the photo sensor to detect the package. As soon as the photocell detects the package, the applicator will blow the label and take the plate back to its rest position.
Synchronism on print – means that the applicator waits for the package presence sensor before printing the next label. Only after the package has been detected will the label be printed and picked up by the applicator and taken to the package where it is applied.
The polarity determines whether the package is considered to have arrived when the photocell is obstructed (Active High) or when the cell is illuminated (Active Low).

e dispenser / rewind (values: 0=strip, 1=rewind);

When the dispensing mode has been selected, the values for J are corrected on the printers that need it to restore the right ratio for the shape. In any case, printers with a firmware release of 2.0 onwards, having the auto positioning function, will take into consideration the fact that the label must not stop under the printhead if it is to be picked off manually. This results in a limited number of millimetres not being available for printing.

t direct thermal / thermal transfer (values: 0=direct, 1=transfer).

The ribbon presence photo sensor will be deactivated automatically when direct thermal is selected. All of the printers in the ST3xx and ST4xx series will automatically configure themselves for direct thermal if they are switched on without a ribbon mounted.

17.30 /Ldllltt

The **/L** command is used to design line segments, starting with the current position of the sensor.

It must be followed by 3 parameters having the following significance:

d direction in which the segment is to be drawn (values: 0=right, 1=down, 2=left, 3=up);
llll length of the segment in dots (values: from 0008 to the border in the selected direction).
tt thickness of the segment in dots (values: from 01 to 99).

The direction of this command has priority over the rotation currently selected for printing (first parameter of the **/R** command), whereas the colour of the lines drawn depends on the type of design currently used (second parameter of the command **/R**): mode 0= colour black, mode 1= colour white , mode 3= colour opposite to that of the background.

Note: the position of the cursor is updated to the opposite corner of the segment to make it easier for complex drawings in that the cursor does not have to be repositioned every time.

17.31 /Mwwwwhhhhttt

The **/M** command is used to draw rectangular borders. The top left corner is in the position of the last command **/E**.

It must be followed by 3 parameters with the following significance:

wwww width in a direction parallel to the printhead (values: from 0008 to the distance from the border).
hhhh height in the direction of the paper feeding (values: from 0008 to the border).
ttt thickness of the border measured in the direction of the centre (values: from 001 to 999).

17.32 /Nssssoooo

The **/N** command is used to control the paper cutter which could be installed on the printer as an optional.

It must be followed by 2 parameters of 4 digits each with the following significance:

ssss number of labels after which it is to cut (values: from 0000 to 9999)
oooo Footstep number of the BackFeed (values: from 0000 to 0200) **ST4XX not in use must be zero.**

The positive values for ssss activate the cutter and define the number of labels to print before cutting.
Negative values define the applicator time cycles in the ST4xx series.
In particular:

AP403 AP514
s_1= is only used for the sign "-" (minus)
s_2= multiplier
s_3= time interval between the end of the print and the blowing of the label.
s_4= time interval between the label being blown and the printing of the next label.
The factor s_2 must be multiplied by s_3 and by s_4 to obtain the time expressed in tenths of a second.
E.g.. $t_3= s_2*s_3$, $t_4= s_2*s_4$, therefore /N-2440000 and /N-1880000 mean the same thing . in fact $t_3= s_2*s_3=2*4=1*8=8$ => 0,8 seconds

AP406 AP516
s_1= is only used for the sign "-" (minus)
s_2= multiplier

s_3= time interval between the end of printing and the moment at which the sensors start to be tested to detect any errors during the run of the piston plate. This time interval should be regulated to make sure that in the first part of its run, the plate does not signal an error when it passes close to the support frame of the applicator.
s_4= time interval between the complete re-entry of the plate (signalled by a sensor) and the printing of the next label.
The factor s_2 must be multiplied by s_3 and by s_4 to obtain the time expressed in tenths of a second.

Values distinct from zero for **OOOO** in the serious ST5xx represent the footstep number of the BackFeed (you shouldn't waste bread and the tape returns in after before the print). If the autocalibration is abilited and in **OOOO** there is 0000, the BackFeed enables automatically when there is the applicator or the dispenser options.

With the BackFeed all label area is printable also the first millimeters. An other function of the backfeed is debit more power to the peeloff. In the case of great labels it is not necessary to write also in the first millimeters, but council however to use the BackFeed for giving more power to the PeelOff. In such case I suggest to use

/N-…0010/H0273/$&%0000100000000000

17.33 /Psss

The **/P** command has the same function as the command /$>P except that it is easier to use in this case.

The /$>P command is used to modify the values for the limits of the sensors giving the values for the new limits to the corresponding sensors. To do this it is necessary to know which sensor has been selected. With the /P parameter a new value is given for the limits of the selected sensor.

It must be followed by 3 numbers which represent the limit within which the firmware will consider the variation for detection (values: from 000 to 255).
This command has the same effect as **/$>P**, but only influences the currently selected sensor, set by the first parameter of the last edited command **/K.**

If the auto calibration has not been deactivate in version 2.0 onwards, changing the value for P will not have any effect because the value for the limit is calculated by the printer.

The transparency photo sensors detect the quantity of infra red light which passes across the materials whereas the reflective sensors measure the quantity of light reflected by the materials. High values correspond to a large amount of light in transparency or reflection of the materials and vice versa.

A reliable detection of the gap means that the difference in signal (the contrast) generated by the detection of the discontinuity (holes, serrated edges, marks etc.) are significantly

greater than the difference in signal (the noise) resulting from the optical discontinuity in the material – especially if there are pre-printed areas around the sensors.

To have an indication of the transparency / reflective ness of the material, the correct sensor should be chosen and a test label printed with the command **/U00**. The material should first be correctly positioned under the sensor.

17.34 /Qbbbllllg.. g

The **/Q** command is used to download a rectangular graphic bitmap and insert it with its top left corner in the position of the last command **/E**.

It must be followed by 2 parameters which define the dimension of the bitmap and by the binary data which represents its contents as follows:

bbb	**Number of bytes (groups of 8 adjacent dots) which make up every single line of the bitmap, three digits (values: from 001 to 999 or from -01 to -99);**
llll	**number of lines which make up the graphic block, (values: from 0001 to 9999);**
g..g	**data which defines the bitmap.**

If the bbb parameter is positive, the data flow will consist of a series of bytes with a total which is the number of bytes per line multiplied by the number of lines. If the bbb parameter is negative, each byte is replaced by a couple of hexadecimal characters (from 00 to FF) which represent the binary value. Each line is terminated by a sequence of CR+LF.

This alternative alphanumeric format is less efficient than pure binary (the flow of data is more than double the length) but is very useful when the external computer cannot manage binary data but only ASCII characters. The flow of bytes is configured as follows: each bit represents a single dot (1=print, 0=blank), and the most significant bit is on the left. The bytes of each line are ordered from left to right and from top to bottom.

The block will be automatically truncated if it exceeds the lower margin of the printable area, depending on the rotation selected.

17.35 /Roc

The **/R** command is used to set the orientation and the colour of the barcode, lines, borders and graphics.

It must be followed by 2 single digits with the following significance:

o orientation (values: 0=normal, 1=90° clockwise, 2=180°, 3=270°);

c colour in respect to background (values: 0=black, 1=white 2=inverted).

The rotation of parameter **o** is ignored by the **/L** command which contains an orientation parameter.

Colour 0 (black) is normally used where black objects must be printed on a white background. Colour 2 (inverted) is used when white articles must be printed on a black background : in this case the background must be created first (the **/M** command can be used to design a black box). Colour 1 (white) is normally used in special cases to design white lines on a black background thereby avoiding problems which exist at the intersections if colour 2 is used.

17.36 /Tn

The **/T** command is used to change between fonts in RAM and EPROM.
It must be followed by a single parameter which can be 0 or 1.

e.g.

E0100100T0F111prova

will write “prova” in position 100,100 with font 1 expansion x=1 y=1. this font is obtained from the EPROM.

E0100100T1F111prova

will write “prova” in position 100,100 with font 1 expansion x=1 y=1. this font is obtained from the RAM. The fonts in the standard RAM are the so-called proportionately spaced fonts but these fonts can redesigned or replaced as the need arises.

17.37 /Umm o /Uddffffffff

The **/U** command is used to recall a "macro". A "macro" is a sequence of commands , for example a complete label,. The macro can be memorised in a FLASH, however there are some macros which are memorised by default in the EPROM e.g. macro U00. The macro U00 is a test label used to verify the configuration of the printer.

It must be followed by 2 characters which, depending on the value, can be followed by 8 characters having the following significance:

mm Macro number, 2 digits (values: from 00 to 99). The test label is printed with 00 otherwise the corresponding macro allocated in the flash memory (if present) will be executed.

dd Identifies the source of the data, 2 characters (values: A: or B:).
A: refers to the eprom which contains some macros defined in the factory.
B: refers to the FLASH (optional) for ST3xx series.
C: refers to the FLASH (optional) for ST4xx ST5xx series.
Refer to the relevant section for a more detailed explanation of the macros.

f.. **f** Macro name, 8 characters (any DOS file name without extension) .Obviously only file names which correspond to macros existing in the memory otherwise nothing will be loaded. If the macro name is less

than 8 characters it must be left justified with the remaining spaces blank.

17.38 /Vssffeppp

The **/V** command is used to set the parameters which control the printing speed, the paper feed speed (speed on an unprinted area), and the energy directed to the printhead (printing intensity).

It must be followed by 4 parameters which have the following significance:

ss print speed in centimetres per second, 2 digits (values: from 02 to max);

e optimisation of printhead energy level (values from 2 to 6): represents the number of active pulses per cycle and is used to regulate the intensity of the black in the printing.

ppp printhead power, 3 digits (values: from 0 to 999).

The print speed is normally set in the range from 50 to 100 mm/s to obtain the best print quality with standard quality labels and ribbons. Print speeds in excess of 150 mm/sec. can result in a deterioration of the print quality unless specific materials are used – paper and ribbons – designed for high-speed printing.

The power level should always be at the minimum value to obtain an acceptable print quality at the selected speed and with the support materials being used. A lower value will result in a greyish print with many faded areas whereas a value which is too high can damage the ribbon and the migration of the pigments on the ribbon can clog the printhead and also give a messy print. If a correct print cannot be found, it could be that the selected speed is too high for the quality of the printing materials being used. There are many qualities of paper and ribbons on the market and your supplier should advise you on the types and quality to use.

17.39 /Wnnnn

The **/W** command is used to print the number of labels specified with the 4 digit parameter **nnnn**, from 0001 to 9999. If the value 0000 is used, the printer will go into an infinite print loop.

During printing, the printer does not normally process other data but can receive it and store it in the buffer until this is full (max 64 Kbytes). New data is processed when the print session is finished and when the printer goes onto ONLINE status.
If the printer has sufficient memory to store 2 complete bitmaps which cover the size of the desired label, the **/ *B** command can be used to abilitate the processing of the data for the next label while the previous label is still being printed. This function is particularly useful when variable data is being printed and this data changes from one label to the next. This will reduce / eliminate the idle time thereby increasing the throughput of the printer.

A printing session can be suspended by pressing the **Pause** key and can then be restarted by pressing the same key. If a print session is to be aborted, the **Pause and Feed** keys should be pressed at the same time.

17.40 /Xiiippp

The **/X** command is used to change the "interline" value and it is expressed in number of dots. The cursor will move down (in relation to the current orientation) with every **LF** command. The value of the "spacing" also expressed in number of dots, will move the cursor to the right (in respect to the selected orientation) every time a new character is designed in the bitmap.

It must be followed by 2 parameters made up of 3 digits with the following significance:

`iii` interline in dots (values: from -99 to 999);
`ppp` spacing in dots (values: from -99 to 999).

Interline and spacing are set by default every time a font is selected according to the character dimensions (see the instructions for the **/F** command). They can be changed with this command by adding or subtracting the desired number of dots.

The correction of the spacing is correlated to the fixed or proportional spaced fonts.

Note: the values input with this command are automatically multiplied by the horizontal and vertical expansion factors set with the last font selection command.

17.41 /Yb.. b

The **/Y** command is used to download a user defined character set which will replace the default international character set. It also uses the area of the memory designated for the magnum and mega fonts.
It must be followed by 256 bytes of binary values from 00 to FF hex (from 0 to 255 dec), defining in this way the correspondence between the printable characters of the ASCII code and the physical position associated with the dot matrix of the font. The character map is common to all fonts.

17.42 /Z

The **/Z** command is used to set the printer back to the configuration stored in the non volatile memory. This function is performed each time the printer is switched on.

Note: the command is executed automatically every time the printer is switched on.

18 Return Codes

The printer can send information about its status to an external device.

Such information can be sent automatically during the reception of data /status of the buffer), whilst it is processing data or printing (status of the printer) or on request (status of the sensors).

The transmission of any communication can be inhibited with the command **/$&%.** This will avoid any undesired interference when there is a connection with a device which does not receive data from the printer.

19 Status of the buffer

The control characters ASCII **DC1** (code 11 hex, 17 dec) and **DC3** (code 13 hex, 19 dec), otherwise known as XON and XOFF, are sent by the printer to advise the external device on the status of the reception buffer's internal 64 Kbytes thereby enabling it to control the data flow even without a physical connection of the RTS line of the printer.

An XOFF character is sent when the RTS line changes level from high to low indicating that the reception buffer is nearly full (more than 60,000 bytes present).

An XON character is sent when the RTS line changes level from low to high (this occurs when the printer is switched on and after the initialisation phase) indicating that there is available space in the reception buffer (less than 50,000 bytes present).

Setting the 14th position of the **/ $&%** command to 1 means that the printer can be configured in such a way that the RTS moves from the print of one label to the next. In this way the printer will result busy whilst it is printing and will return to "ready" at the end of the print. This mode ensures that the buffer is never full with labels.

Another way of keeping the printer "busy" is to send the sequence of commands **VT-US-US-NAK**. The printer will return to ready mode when the reception buffer is completely empty.

If a composition error is encountered in the data received, the **BEL** character (code ASCII 7) will be sent to inform the external device that some characters may have been lost. This normally indicates that the transmission line is disturbed.

See the section on Connections with External Devices for more details on the status of the RTS line and the communication protocols.

20 Status of the sensors

Every time the control character ASCII **ENQ** (code 5) is processed, the printer will send a status communication which is made up by the capital letter "**S**" followed by 5 consecutive numerical characters and a sequence of **CR/LF**.

This message informs the external device about the possibility of successfully starting a print session. The significance of the characters is a follows:

S communication header,
p status of photo sensor for end paper (**0**=paper present , **1**=end paper),
r status of photo sensor for transfer ribbon (**0**=ribbon present , **1**=end ribbon),
d not used ,
c not used,
f flag indicating the type of printhead installed
0=first switch on
A= 3" printhead
B= 6" printhead
C= 2" printhead
2= 4" printhead

the identification of the printhead (parameter **f**) depends on the value currently programmed in the second parameter of the command **/ $>T**.

21 Status of the printer

The control characters ASCII **DC2** (code 12 hex, 18 dec) and **DC4** (code 14 hex, 20 dec) are sent to the printer every time there is a switch between ONLINE status (even on switch on) and OFFLINE, indicating whether the printer can or cannot process commands and characters received from the external computer.

The printer changes between ONLINE and OFFLINE when the operator presses the **Pause** key on the front panel and goes OFFLINE when a non recoverable error arises during a print session.

If the 14th digit of the command **/$&%** is **1,** the printer will send an XOFF and will set itself as busy when it is printing or OFF-LINE. In this case **XON** and **XOFF** are sent together with **DC2** and **DC4** .

The control character ASCII **NAK** (code 15 hex, 21 dec) is sent by the printer every time the Command Interpreter processes a command which contains an error (wrong character, parameters out of range, inexistent macro recalled, etc.).

The control character ASCII **SYN** (code 16 hex, 22 dec) is sent by the printer every time the Command Interpreter process the command of a design where a character, line or graphic block are partially or totally outside of the bitmap.

The control character **ACK** (code 6) is sent every time a print command is processed **(/Wnnnn,** control character **FF**) indicating the start of a print session.

An **ACK** or a **NAK** are sent whenever a block of data sent with **/$>D** is processed (irrespective of whether the checksum is correct or not).

Every time a label is issued, the printer will send a value to indicate the start of the printing, the end and the result of the operation. The communication is a sequence of 6 characters (format **Prnnnn**) followed by a sequence of **CR+LF** (8 characters in total), where the capital letter "P" is sent when the motor starts to move. The rest of the communication is sent when the print cycle of the single label is complete. If the cutter is installed and has been activated, the print cycle will include its start up. If the label is not printed for any reason, the rest of the communication will immediately follow the "P".

The 4 digits **nnnn** will send a signal showing the remaining number of labels to print (from 0000 to 9999), whereas the field represented by **r** indicates the result of the print operation with the following significance:

r = 0	The label has been successfully printed and the print session continues normally unless the label counter has been set to 0000. In this case the print session is terminated (the communication P00000 can be interpreted by the external computer as the normal completion of the print command).
r = 1	Before printing the label, the end paper photo sensor has detected the absence of paper and the print session is suspended with the printer going OFFLINE
r = 2	Before printing the label, the photo sensor has detected the end of the ribbon (only if the printer is operating in thermal transfer mode) and the print session is suspended with the printer going OFFLINE
r = 3	Before printing the label, the printer awaits an external Start signal
r = 4	Not currently used
r = 5	The Pause button has been pressed during the printing indicating that there has been a manual stop or that the command sequence **DLE-US-US-NAK** has been received. The print session is suspended when the current label is complete and the printer goes OFFLINE
r = 6	Before printing the label, the sensor has detected an excessive printhead temperature (above 60°C) and the printer will wait until this temperature drops below the limit before automatically resuming the print session
r = 7	Before printing the label, the printhead-closed micro switch is opened indicating that the printhead is not in the correct position for printing. The print session is suspended and the printer goes into OFFLINE
r = 8	After the label has been printed and if the leading edge of the next label is not detected within the predefined length (set by the first parameter of the **/$>S** command), the motor will stop and the printer will go OFFLINE
r = 9	If the **Pause** and **Feed** buttons are pressed together during a print session or if the command sequence **SI-US-US-NAK** is received, the print session is terminated with the end of the current label and without completing the number of labels initially requested. The printer then goes ONLINE.
r = J	The AP406 or AP516 applicator is not in the home location before the beginning of

	the print of the label. Only new firmware relais.

Printing the test label or copies with the FEED key does not generate any communication.

22 MACRO

A “macro”, or a “macro command” consists of a sequence of commands and/or printable characters which follow the syntax described for the commands received from an external computer. The macro can be permanently stored in the FLASH memory and can be accessed through the **/U** command or the front panel.
The printers in the series 400,500 and 300 (currently ST403, ST406, ST514, St516 ST302, ST312, ST314) can have a 512kb Flash mounted where it is possible to store a maximum of 100 predefined macros (labels). The actual maximum number of labels that can be stored obviously also depends on the on the size of the labels. The Flash memory is seen by the printer as a read only diskette. The WinLW programme is used to send the macro labels into the Flash memory of the printer.

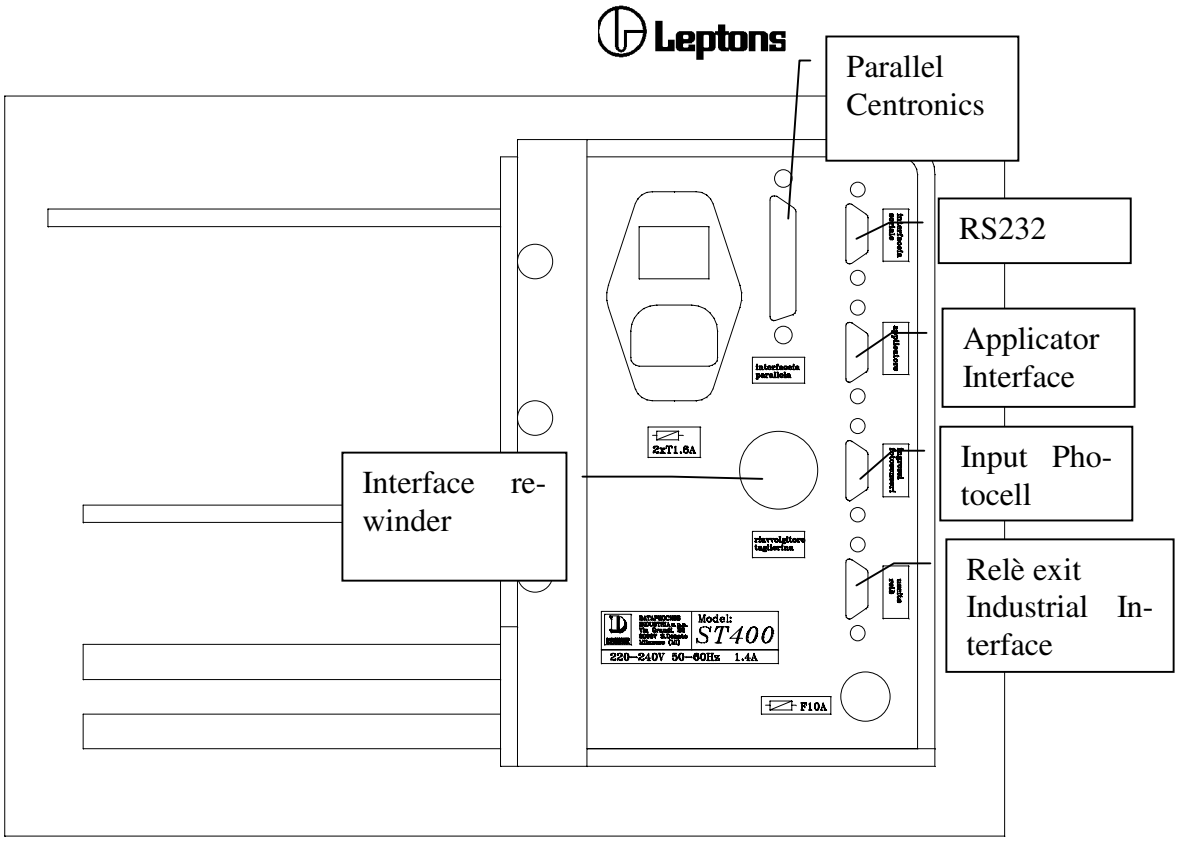
The Macro named “AUTOEXEC”, if present in the Flash memory, is automatically executed when the printer is switched on.

23 Communication Ports

ST3xx:
- Serial RS232

ST4xx:

ST5xx:
- Serial RS232
- Parallel CENTRONICS
- Applicator
- Industrial interface:
  - Input
  - Output
- Rewinder



23.1 Serial Ports ST3xx ST4xx ST5xx

The printer is equipped with a female 9 pin type "D" connector which is located on the rear panel and through which it is possible to establish a bi-directional asynchronous communication with an external device (normally a PC or other compatible equipment). The connection cable for a PC can be purchased from DATAPROCESS with the Article code L50500009

The following explains the pin connections for RS232:

1	Not connected
2	Input, Reception of Data(RxD)
3	Output,Transmission of Data(TxD)
4	Not connected
5	Massa logica(GND)
6	Not connected
7	Output, ready to receive(RTS)
8	Input, ready to send (CTS)
9	Not connected

Communication speeds and other parameters can be selected with the /$>B command. The values are permanently stored in the non-volatile memory. Refer to the command instructions for the communication parameters.

23.2 Parallel Port – only for ST4xx ST5xx

This is the female 25 pin type "D" located on the rear panel of the printer. The communication protocol is the standard Centronics and the port is currently only mono direction (communication with data only on input at the port). The connection cable for a PC is not a standard cable and can be purchased from DATAPROCESS EUROPE with Article code L50500010

The following explains the pin connections for the connector:

1	/STROBE
2	DATA1
3	DATA2
4	DATA3
5	DATA4
6	DATA5
7	DATA6
8	DATA7
9	DATA8
10	/ACKNOWLEDGE
11	BUSY
12	PAPER EMPTY
13	SELECT
14	not connected
15	+5VDC auxiliary power
16	not connected
17	not connected
18	GROUND
19	GROUND
20	GROUND
21	GROUND
22	GROUND
23	GROUND
24	GROUND
25	GROUND

23.3 Industrial Interface – only for ST4xx ST5xx

The ST4xx and St5xx series of printers is equipped with an "industrial" interface which can be used to connect the printers or applicators to an external environment with input and output signals. The input and output have distinct connectors. The connectors are located on the rear panel and have "D" 9 pin male for the "output" and "D" 9 pin female for the "input".

23.3.1 Output (relè) "D" 9 pin male

The signals available for the external devices are READY and SYNC. The signals are supplied by open or closed contacts.

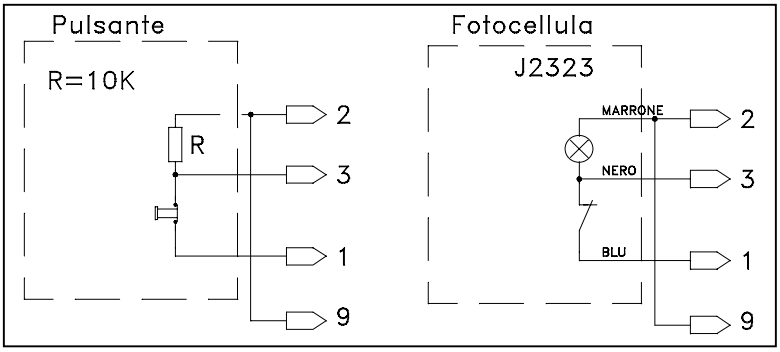
1	READY - Common1
2	READY - Normally open1
3	READY – Normally closed2
4	READY - Common2
5	READY – Normally open2
6	SYNC – Normally closed
7	SYNC - Common
8	SYNC – Normally open
9	READY – Normally closed1

The status normally open and normally closed refers to inactive signals.
The **READY** signal is active when the printer is in "normal" working conditions i.e. it is ON-LINE or it is printing. It is inactive when the printer is OFF-LINE or simply switched off.
The same rules apply for the DTR signal of the serial RS232.
The **SYNC** signal gives the synchronism for the automatic applicators. The signal is supplied by an external controller to indicate that a print session has started. The signal is activated when the printer is configured as an applicator (/*A1 or /*A2 e N-xxx0000). The signal is configured through the /a parameter. In particular, if /a0 =>SYNC is active when an application cycle starts (printing of label and its application) and becomes inactive at the end of the cycle when the photocell is again ready to detect the presence of a package. If /a1 => SYNC is active when a print session starts (one or more labels) and becomes inactive at the end of the session (there is no transition between one cycle and the next).
If the external photocell is deactivated i.e. package present, the two modes of operation become similar. Only if the photocell is in function and there is therefore a time interval between one cycle and the next will the two configurations be effectively different.
In this case, if only one label is printed /W0001, the signal is active when the printer starts to print and becomes inactive at the end of the print. If instead a batch of labels is printed /W0050, there is only one transition of the signal and not at the end of each single label.

23.3.2 Input (optoisolated) "D" 9 pin female

The input signals are used to synchronise the printing of the label with external events e.g. the removal of a label (dispenser mode) or the arrival of a package which has to have a label applied to it. (applicator photo cell).
The signals can be generated by photocells or simple switches. The following table gives the connections for either case:

1	GROUND
2	Opto1 +
3	Opto1 -
4	Not connected
5	Not connected
6	Not connected
7	Opto2 -
8	Opto2 +
9	+12VDC (500mA max)



The switch or the photocell are connected in this way if the signal is to synchronise with the presence of the package (K1501 N-1990000 in un AP403).
If instead the synchronisation is to be with the removal of the label (K1100 N00010000 in ST403) it is sufficient to replace in the cable point 2 with 8 and 3 with 7.

23.4 Applicator interface – only for ST4xx ST5xx

This port also has a "D" 9 pin female connector which is also on the rear of the printer. The following table gives the connections:

1	GROUND
2	Input1
3	Output1
4	Input2
5	Output2
6	Input3
7	Output3
8	Input4
9	+12VDC (500mA max)

23.5 Rewinder interface – only for ST4xx ST5xx

1	Not connected
2	Input synchronism for cutter
3	GROUND
4	Output rewinder motor 14VDC Max 2A